Appendix B
Initial CHART Assessment for the
Lower Columbia River Chinook Salmon ESU

CHART Participants

The CHART for this ESU consisted of the following NOAA Fisheries biologists: Ben Meyer (CHART Leader), Michelle Day, Dan Guy, Lynne Krasnow, Lance Kruzic, Nancy Munn, Mindy Simmons, Cathy Tortorici, and Rich Turner. This CHART assessment also benefitted from review and comments from the Oregon and Washington Departments of Fish and Wildlife.

ESU Description

The Lower Columbia River chinook salmon ESU includes all naturally spawned populations of chinook salmon from the Columbia River and its tributaries from its mouth at the Pacific Ocean upstream to a transitional point between Washington and Oregon east of the Hood River and the White Salmon River, and includes the Willamette River to Willamette Falls, Oregon, exclusive of spring-run chinook salmon in the Clackamas River (64 FR 14208; March 24, 1999). Myers et al. (2003) identified 31 historical demographically independent chinook salmon populations in this ESU consisting of three life history types (spring-, fall-, and late fall-run).

The following brief description is based largely on life history information and excerpts from the report of the Lower Columbia Fish Recovery Board (LCFRB 2003) and the Willamette/Lower Columbia River Technical Recovery Team's (TRT) recent review of historical population structure for this ESU (Myers et al. 2003).

Of the Pacific salmon, chinook salmon exhibit the most diverse and complex life history strategies. Chinook salmon follow one of two general freshwater cycles: stream or ocean type. After emerging from the gravel, stream-type chinook salmon reside in fresh water for a year or more before migrating to the ocean. Ocean-type chinook salmon migrate to the ocean within their first year. These two types of chinook salmon have different life history traits, geographic distribution, and genetic characteristics. Chinook in the lower Columbia River generally follow an ocean-type life history cycle.

Runs are designated on the basis of when adults enter freshwater; however, distinct runs may also differ in the degree of maturation at river entry and time of spawning. Early, spring-run (stream-maturing) chinook salmon tend to enter freshwater as immature or bright fish, migrate upriver (holding in suitable thermal refuges for several months), and finally spawn in late summer and early autumn. Late, fall-run (ocean maturing) chinook

salmon enter freshwater at an advanced stage of maturity, move rapidly to their spawning areas on the main stem or lower tributaries of the rivers, and spawn within a few days or weeks of freshwater entry. Fall chinook dominate chinook salmon runs in this ESU. Today, the once abundant natural runs of fall and spring chinook have been largely replaced by hatchery production. Large chinook runs continue to return to many of their natal streams, but there are few sustained native, naturally reproducing populations.

Adult spring chinook return to the Columbia River at 4 to 5 years of age. They enter the Columbia River in March and April and generally enter natal basins from March through June, well in advance of spawning in August and September. Spring chinook typically spawn in headwater areas where higher gradient habitat exists. Successful spawning depends on sufficient clean gravel of the right size, in addition to the constant need of adequate flows and water quality. Fall chinook return to the Columbia River at 3 to 4 years of age, although 5-year olds are common in some populations. They enter fresh water from August to September and spawning generally occurs from late September to November, with peak spawning activity in mid-October. Bright fall chinook adults enter the Columbia River August to October; dominant age class varies by population and brood year, but is typically age 4. Spawning occurs in November to January, with peak spawning in mid November.

Chinook salmon eggs incubate throughout the autumn and winter months. As with other salmonids, water temperature controls incubation time and affects survival. During incubation, clean, well-oxygenated water flow is critical. Floods/scouring, dewatering, and sedimentation can result in high egg mortality. In the lower Columbia River, spring chinook fry emerge from the gravel from November through March; peak emergence time is likely December and January. Fall chinook fry generally emerge from the gravel in April, depending on the time of egg deposition and incubation water temperature. The emerging fry quickly migrate to quiet waters and off-stream areas where they can find food and protection from predators.

After emerging from the gravel in the spring, most fall chinook fry rear in the freshwater habitat for 1 to 4 months before emigrating to the ocean as subyearlings. A few fall chinook remain in fresh water until their second spring and emigrate as yearlings. Conversely, spring chinook emerge from the gravel earlier than fall chinook, generally in the late winter/early spring. Normally, spring chinook spend one full year in fresh water and emigrate to sea in their second spring. After emergence fry generally search for suitable rearing habitat within side sloughs, side channels, spring-fed seep areas and along the outer edges of the stream. These quiet-water side margin and off-channel slough areas are vital for early juvenile habitat. The presence of woody debris and

overhead cover aid in food and nutrient inputs, and provide protection from predators during early freshwater residence.

Juvenile chinook salmon in freshwater feed on a variety of terrestrial and aquatic insects and crustaceans, while subadults feed on similar items as well as larger prey including fishes, shrimp, and squid (Scott and Crossman, 1973). One study noted that adults in marine waters forage on a large array of fish species, especially herring and sand lance (Pritchard and Tester 1944 as cited in Scott and Crossman 1973).

CHART Area Assessments and Initial Conservation Value Ratings

The Willamette/Lower Columbia Technical Recovery Team (TRT) has placed groups of populations in this recovery planning domain into "strata" intended to assist in evaluating ESU-wide recovery scenarios (McElhany et al. 2002). The strata are based on major life history characteristics (e.g., species run types) and ecological zones. The lower Columbia River chinook salmon ESU inhabits three ecological zones (Coast Range, Cascade, and Columbia Gorge) and contains three life history types (spring-, fall-, and late-fall run chinook salmon), resulting in six strata for this ESU: Coast range fall-run populations; Cascade spring-, fall-, and late fall-run populations; and Columbia Gorge spring- and fall-run populations (McElhany et al. 2002). Recovery planning will likely emphasize the need for a geographical distribution of viable populations across the range of such strata/regions in an ESU (Ruckelshaus et al. 2002, McElhany et al. 2003). Therefore, as part of its assessment the CHART considered the conservation value of each HUC5 in the context of the populations within these strata.

The CHART assessment for this ESU addressed 10 subbasins containing 47 occupied watersheds, as well as the lower Columbia River rearing/migration corridor. Subbasins were chosen as freshwater critical habitat units because they present a convenient and systematic way to organize the CHART's watershed assessments for this ESU.

Unit 1. Middle Columbia/Hood Subbasin (HUC4# 17070105)

The Middle Columbia/Hood subbasin is located in the eastern portion of the Columbia River gorge of Oregon and Washington. Occupied watersheds in this subbasin are contained in Hood River, Multnomah, and Wasco counties in Oregon, and Klickitat and Skamania counties in Washington. The subbasin contains 13 watersheds, 8 of which are occupied by this ESU. Occupied watersheds encompass approximately 1,370 mi^2 and 1,494 miles of streams. Fish distribution and habitat use data from the Oregon Department of Fish and Wildlife (ODFW) and Washington Department of Fish and

Wildlife (WDFW) identify approximately 145 miles of occupied riverine habitat in the watersheds, including a 23-mile segment of the Columbia River (ODFW 2003a,b; WDFW 2003). Myers et al. (2003) identified a single ecological zone (Columbia Gorge) containing four fall-run (Lower Gorge tributaries, Upper Gorge tributaries, Big White Salmon River, and Hood River) and two spring-run (Big White Salmon River and Hood River) historical demographically independent populations in this subbasin. The Upper Gorge tributaries fall-run and Big White Salmon fall- and spring-run populations have been classified by the TRT as "core" populations, i.e., historically abundant and "may offer the most likely path to recovery" (McElhany et al. 2003). Native spring-run chinook salmon are believed to be extirpated in this subbasin, although efforts are underway to reestablish these fish.

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this ESU. Table B1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map B1 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation. The CHART also determined that the occupied HUC5 watersheds in this subbasin were of either high or medium conservation value to the ESU. Of the eight HUC5s reviewed, six were rated as having high and two were rated as having medium conservation value. The CHART noted that two HUC5s (Middle Columbia/Eagle Creek and Middle Columbia/Grays Creek) contain a high value rearing and migration corridor in the Columbia River connecting high value upstream watersheds with downstream reaches and the ocean. Table B2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure B1 shows the overall distribution of ratings by HUC5 watershed.

The CHART also considered whether blocked historical habitats above Condit Dam (on the White Salmon River) may be essential for conservation of the ESU. The Team determined that accessing this habitat would likely provide a benefit to the ESU, especially for spring-run chinook salmon of which there are only two historical populations in the Gorge region. However, the CHART concluded that it was unclear whether the areas above Condit Dam are essential for conservation of the entire ESU, especially in comparison to other, more extensive, historical habitats that may be of greater potential benefit to the ESU (e.g., areas in the Upper Lewis River).

Unit 2. Lower Columbia/Sandy Subbasin (HUC4# 17080001)

The Lower Columbia/Sandy subbasin is located in the western portion of the Columbia River gorge of Oregon and Washington. Occupied watersheds in this subbasin are contained in Clackamas, Columbia, and Multnomah counties in Oregon, and Clark and Skamania counties in Washington. The subbasin contains nine watersheds, all of which are occupied by this ESU. Occupied watersheds encompass approximately 1,076 mi^2 and 1,316 miles of streams. Fish distribution and habitat use data from the Oregon Department of Fish and Wildlife (ODFW) and Washington Department of Fish and Wildlife (WDFW) identify approximately 217 miles of occupied riverine habitat in the watersheds, including a 26-mile segment of the Columbia River (ODFW 2003a,b; WDFW 2003). Myers et al. (2003) identified two ecological zones (Cascade and Columbia Gorge) containing five fall-run (Lower Gorge tributaries, Sandy River early fall, Sandy River late fall, Washougal River, and Salmon Creek/Lewis River) and one spring-run (Sandy River) historical demographically independent populations in this subbasin. The Sandy River late fall- and spring-run chinook salmon have been classified by the TRT as "core" populations, i.e., historically abundant and "may offer the most likely path to recovery" (McElhany et al. 2003). Also, the TRT classified the Sandy River spring- and late fall-runs and the Salmon Creek/Lewis River fall-run as genetic legacy populations, i.e., some of "the most intact representatives of the genetic character of the ESU" (McElhany et al. 2003).

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this ESU. Table B1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map B2 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation. The CHART also determined that the occupied HUC5 watersheds in this subbasin ranged from high to low conservation value to the ESU. Of the nine HUC5s reviewed, seven were rated as having high, one was rated as having medium, and one was rated as having low conservation value. The CHART also noted that one HUC5 (Columbia Gorge Tributaries) contains a high value rearing and migration corridor in the Columbia River connecting high value upstream watersheds with downstream reaches and the ocean. Table B2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure B1 shows the overall distribution of ratings by HUC5 watershed.

The CHART also concluded that inaccessible reaches above the Bull Run Dam complex in the Bull Run River HUC5 may be essential to the conservation of the ESU. The

CHART concluded that these unoccupied areas may be essential because (1) they once supported TRT core and genetic legacy populations (Sandy River spring- and late fall-runs) and (2) they contain non-inundated habitats that are likely in good to excellent condition (i.e., the watershed provides domestic drinking water for the City of Portland and may have been some of the better spawning areas) (Sieglitz 2002, McElhany et al. 2003). The CHART noted that NOAA Fisheries' status review of this ESU stated that habitat loss due to "extensive hydropower development projects" posed a serious threat to this ESU (NOAA Fisheries 2003). This report also expressed serious concerns associated with dramatic declines in the spring-run life history type (which inhabits this watershed). Therefore, the CHART concluded that the ESU would likely benefit if the extant population of spring-run fish had access to spawning/rearing habitat upstream and that these areas may warrant consideration as critical habitat.

Unit 3. Lewis Subbasin (HUC4# 17080002)

The Lewis subbasin is located in southwest Washington and contained in Clark, Cowlitz, and Skamania counties (a very small and unoccupied portion in the uppermost watershed is contained in Yakima County). The subbasin contains six watersheds, two of which are currently occupied by this ESU and the remaining four are now blocked by Merwin Dam and others upstream. Occupied watersheds encompass approximately 456 mi^2 and 561 miles of streams. Fish distribution and habitat use data from the Washington Department of Fish and Wildlife (WDFW) identify approximately 68 miles of occupied riverine habitat in the watersheds (WDFW 2003). Myers et al. (2003) identified a single ecological zone (Cascade) containing one spring-run (Lewis River), one fall-run (Salmon Creek/Lewis River) and one late fall-run (Lewis River) historical demographically independent populations in this subbasin. The TRT has classified the Lewis River spring- and late fall-run populations as "core" populations (historically abundant and "may offer the most likely path to recovery") and the Lewis River late fall-run and Salmon Creek/Lewis River fall-run populations as genetic legacy populations (some of "the most intact representatives of the genetic character of the ESU") (McElhany et al. 2003).

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this ESU. Table B1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map B3 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation. The CHART also determined

that both of the occupied HUC5 watersheds in this subbasin were of high conservation value to the ESU. Table B2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure B1 shows the overall distribution of ratings by HUC5 watershed.

The CHART also concluded that inaccessible reaches above Merwin, Yale and Swift dams may be essential to the conservation of the ESU. The CHART believed that these unoccupied areas may be essential because (1) they once supported TRT core and genetic legacy populations and (2) they contain non-inundated habitats that are likely in good condition relative to other more urbanized watersheds in the Cascade region (Lower Columbia River Fish Recovery Board 2003, McElhany et al. 2003). The CHART noted that NOAA Fisheries' status review of this ESU stated that habitat loss due to "extensive hydropower development projects" posed a serious threat to this ESU (NOAA Fisheries 2003). This report also expressed serious concerns associated with dramatic declines in the spring-run life history type (which inhabits this watershed). Therefore, the CHART concluded that the ESU would likely benefit if the extant population of spring-run fish had access to spawning/rearing habitat upstream and that these areas may warrant consideration as critical habitat.

Unit 4. Lower Columbia/Clatskanie Subbasin (HUC4# 17080003)

The Lower Columbia/Clatskanie subbasin is located in southwest Washington and northwest Oregon. Occupied watersheds in this subbasin are contained in Clatsop and Columbia counties in Oregon, and Cowlitz, Lewis, Skamania, and Wahkiakum counties in Washington. The subbasin contains six watersheds, all of which are occupied by this ESU. Occupied watersheds encompass approximately 841 mi^2 and 977 miles of streams. Fish distribution and habitat use data from the Oregon Department of Fish and Wildlife (ODFW) and Washington Department of Fish and Wildlife (WDFW) identify approximately 170 miles of occupied riverine habitat in the watersheds (ODFW 2003a,b; WDFW 2003). Myers et al. (2003) identified two ecological zones (Coast Range and Cascade) containing five fall-run (Elochoman River, Mill Creek, Kalama River, Clatskanie River, and Scappoose River) and one spring-run (Kalama River) historical demographically independent populations in this subbasin. The Elochoman River fall-run population has been classified by the TRT as a "core" population, i.e., historically abundant and "may offer the most likely path to recovery" (McElhany et al. 2003).

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this ESU. Table B1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning,

rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map B4 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation. The CHART also determined that the occupied HUC5 watersheds in this subbasin ranged from high to low conservation value to the ESU. Of the six HUC5s reviewed, two were rated as having high, three were rated as having medium conservation value, and one was rated as having low conservation value to the ESU. Table B2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure B1 shows the overall distribution of ratings by HUC5 watershed.

Unit 5. Upper Cowlitz Subbasin (HUC4# 17080004)

The Upper Cowlitz subbasin is located in southwest Washington and contained in Lewis, Pierce, Skamania, and Yakima counties. The subbasin contains five watersheds, all of which are occupied by this ESU. Occupied watersheds encompass approximately 1,030 mi^2 and 1,282 miles of streams. Fish distribution and habitat use data from the Washington Department of Fish and Wildlife (WDFW) identify approximately 104 miles of occupied riverine habitat in the watersheds (WDFW 2003). All of this habitat is located upstream of impassable dams (Mayfield and Mossyrock) and only accessible to anadromous fish via trap and haul operations. Myers et al. (2003) identified one ecological zone (Cascade) containing one fall-run (Upper Cowlitz River) and two spring-run (Upper Cowlitz River and Cispus River) historical demographically independent populations in this subbasin. Both spring-run populations have been classified by the TRT as "core" populations, i.e., historically abundant and "may offer the most likely path to recovery" (McElhany et al. 2003). In addition, the TRT classified the Upper Cowlitz River spring-run population as a genetic legacy population, i.e., one of "the most intact representatives of the genetic character of the ESU." However, there are significant uncertainties about the remaining stock structure in this subbasin (Myers et al. 2003).

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this ESU. Table B1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map B5 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation. The CHART also determined that the occupied HUC5 watersheds in this subbasin were all of high conservation value to the ESU. Table B2 summarizes the CHART's PCE/watershed scores and initial

conservation value ratings, and Figure B1 shows the overall distribution of ratings by HUC5 watershed.

Unit 6. Lower Cowlitz Subbasin (HUC4# 17080005)

The Lower Cowlitz subbasin is located in southwest Washington and contained in Cowlitz, Lewis, and Skamania counties. The subbasin contains eight watersheds, all of which are occupied by this ESU. Occupied watersheds encompass approximately 1,460 mi^2 and 1,510 miles of streams. Fish distribution and habitat use data from the Washington Department of Fish and Wildlife (WDFW) identify approximately 350 miles of occupied riverine habitat in the (WDFW 2003). Habitat in two HUC5 watersheds – Tilton River and Riffe Reservoir – is located upstream of impassable dams (Mayfield and Mossyrock) and only accessible to anadromous fish via trap and haul operations. Data from WDFW identified very little chinook salmon distribution in the Riffe Reservoir HUC5 watershed (and did not identify the Riffe and Mayfield lakes as occupied habitat). However, the CHART determined that these lakes are occupied and contain PCEs for rearing/migrating juveniles based on information regarding migrants described in Wade (2000) as well as their own knowledge of trap and haul operations in this subbasin. Myers et al. (2003) identified one ecological zone (Cascade) containing four fall-run (Coweeman River, Toutle River, Lower Cowlitz River, and Upper Cowlitz River) and four spring-run (Toutle River, Tilton River, Upper Cowlitz River, and Cispus River) historical demographically independent populations in this subbasin. The latter two spring-run populations as well as the Toutle River and Lower Cowlitz River fall-run populations have been classified by the TRT as "core" populations, i.e., historically abundant and "may offer the most likely path to recovery" (McElhany et al. 2003). In addition, the TRT classified the Upper Cowlitz River spring-run and Coweeman River fall-run as genetic legacy populations, i.e., some of "the most intact representatives of the genetic character of the ESU."

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this ESU. Table B1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map B6 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation. The CHART determined that the occupied HUC5 watersheds in this subbasin were of high or medium conservation value to the ESU. Of the eight HUC5s reviewed, four were rated as having high and four were rated as having medium conservation value to the ESU. The CHART also noted that four

HUC5s (Riffe Reservoir, Jackson Prairie, East Willapa, and Coweeman River) contained high value rearing and migration corridors connecting high value upstream watersheds with downstream reaches and the ocean. Table B2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure B1 shows the overall distribution of ratings by HUC5 watershed.

Unit 7. Lower Columbia Subbasin (HUC4# 17080006)

The Lower Columbia subbasin is located at the mouth of the Columbia River in southwest Washington and Northwest Oregon. Occupied watersheds in this subbasin are contained in Clatsop County, Oregon, and Lewis, Pacific, and Wahkiakum counties in Washington. The subbasin contains three watersheds, all of which are occupied by this ESU. Occupied watersheds encompass approximately 515 mi^2 and 638 miles of streams. Fish distribution and habitat use data from the Oregon Department of Fish and Wildlife (ODFW) and Washington Department of Fish and Wildlife (WDFW) identify approximately 120 miles of occupied riverine habitat in the watersheds (ODFW 2003a,b; WDFW 2003). Myers et al. (2003) identified a single ecological zone (Coast Range) containing three fall-run historical demographically independent populations in this subbasin (Grays River, Youngs Bay, and Big Creek). The Big Creek fall-run population has been classified by the TRT as a "core" population, i.e., historically abundant and "may offer the most likely path to recovery" (McElhany et al. 2003).

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this ESU. Table B1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map B7 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation. The CHART also determined that the occupied HUC5 watersheds in this subbasin were of either high (Big Creek and Grays Bay) or medium (Youngs River) conservation value to the ESU. Table B2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure B1 shows the overall distribution of ratings by HUC5 watershed.

Unit 8. Middle Willamette Subbasin (HUC4# 17090007)

The portion of the Middle Willamette River subbasin occupied by this ESU is downstream of Willamette Falls and includes a single HUC5 watershed (Abernethy Creek) as well as a short segment (approximately 1 mile) of the Willamette River downstream of Willamette Falls. Occupied portions of this subbasin within the ESU's

range are contained in Clackamas County, Oregon. The Abernethy Creek watershed encompasses approximately 134 mi^2 and 171 miles of streams. Fish distribution and habitat use data from the Oregon Department of Fish and Wildlife (ODFW) identify approximately 3 miles of occupied riverine habitat in the subbasin (ODFW 2003a,b). The occupied portions of the subbasin are in the Cascade ecological zone identified by Myers et al. (2003), but the TRT did not associate fish in this area with a historical demographically independent population (McElhany et al. 2003). However, the mouth of Abernethy Creek enters the Willamette upstream and in close proximity (less than 0.6 miles) to the mouth of the Clackamas River which does contain a fall-run population identified by the TRT.

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that all of the occupied areas in the Abernethy Creek watershed contain one or more PCEs for this ESU. Table B1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map B8 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation. The CHART also determined that the Abernethy Creek HUC5 watershed was of low conservation value to the ESU. Table B2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure B1 shows the overall distribution of ratings by HUC5 watershed.

Unit 9. Clackamas Subbasin (HUC4# 17090011)

The Clackamas subbasin is a Cascade Range drainage of the lower Willamette River and is contained in Clackamas and Marion counties, Oregon. The subbasin contains six watersheds, two of which are occupied by this ESU (Lower Clackamas and Eagle Creek). Occupied watersheds encompass approximately 270 mi^2 and 339 miles of streams. Fish distribution and habitat use data from the Oregon Department of Fish and Wildlife (ODFW) identify approximately 54 miles of occupied riverine habitat in the watersheds (ODFW 2003a,b). Myers et al. (2003) identified a single ecological zone (Cascade) containing a single historical demographically independent population in this subbasin (Clackamas River fall-run). This fall-run population has been classified by the TRT as a "core" population, i.e., historically abundant and "may offer the most likely path to recovery" (McElhany et al. 2003).

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this ESU. Table B1 summarizes the total

number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map B9 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation. The CHART also determined that the occupied HUC5 watersheds in this subbasin were of high (Lower Clackamas River) and low (Eagle Creek) conservation value to the ESU. Table B2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure B1 shows the overall distribution of ratings by HUC5 watershed.

Unit 10. Lower Willamette Subbasin (HUC4# 17090012)

The Lower Willamette subbasin is located at the confluence of the Willamette and Columbia rivers in Northwest Oregon. Occupied watersheds in this subbasin are contained in Clackamas, Multnomah, and Washington counties, Oregon. The subbasin contains three watersheds, all of which are occupied by this ESU. Occupied watersheds encompass approximately 407 mi^2 and 448 miles of streams. Fish distribution and habitat use data from the Oregon Department of Fish and Wildlife (ODFW) identify approximately 89 miles of occupied riverine habitat in the watersheds (ODFW 2003a,b). Myers et al. (2003) identified a single ecological zone (Cascade) containing two fall-run historical demographically independent populations in this subbasin (Clackamas River and Scappoose River). The Clackamas River fall-run population has been classified by the TRT as a "core" population, i.e., historically abundant and "may offer the most likely path to recovery" (McElhany et al. 2003).

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this ESU. Table B1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map B10 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation. The CHART also determined that the occupied HUC5 watersheds in this subbasin were of either high (Columbia Slough/Willamette) or medium (Johnson Creek and Scappoose Creek) conservation value to the ESU. The CHART also noted that Coulmbia Slough and Smith and Bybee Lakes may provide important rearing habitat for juvenile chinook salmon. Table B2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure B1 shows the overall distribution of ratings by HUC5 watershed.

Unit 11. Lower Columbia River Corridor

For the purposes of describing units of critical habitat designation for this ESU, NOAA Fisheries defines this corridor as that segment of the Columbia River from the confluences of the Sandy River (Oregon) and Washougal River (Washington) to the Pacific Ocean. This corridor overlaps with the following counties: Clatsop, Columbia, and Multnomah counties in Oregon, and Clark, Cowlitz, Pacific, and Wahkiakum counties in Washington. Fish distribution and habitat use data from ODFW and WDFW identify approximately 118 miles of occupied riverine and estuarine habitat in this corridor (ODFW 2003a,b; WDFW 2003). Table B1 summarizes the total number of occupied reaches in this corridor containing rearing or migration PCEs, as well as management activities that may affect the PCEs.

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that the lower Columbia River corridor was of high conservation value to the ESU. Other upstream reaches of the Columbia River corridor (within Units 1 and 2 above) are also high value for rearing/migration. The CHART noted that the lower Columbia River corridor connects every watershed and population in this ESU with the ocean and is used by rearing/migrating juveniles and migrating adults. The Columbia River estuary is a particularly important area for this ESU as both juveniles and adults make the critical physiological transition between life in freshwater and marine habitats (Marriott et al. 2002).

Marine Areas

NOAA Fisheries' analysis focused on freshwater and estuarine habitats upstream of the mouth of the Columbia River. While marine areas are occupied by this ESU, within this vast area the agency has not identified "specific areas within the geographical area occupied by the species . . . on which are found those physical or biological features . . . essential to the conservation of the species."

References and Sources of Information

References cited above as well as key reports and data sets reviewed by the CHART include the following:

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Table B1. Summary of Occupied Areas, PCEs, and Management Activities Affecting PCEs for the Lower Columbia River Chinook Salmon ESU

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Spawning / Rearing PCEs (mi)	Rearing/ Migration PCEs (mi)	Presence/ Migration Only PCEs (mi)*	Management Activities**
B1	Middle Columbia/Hood	East Fork Hood River	1707010506	23.1	0.0	0.0	A, C, F, I, R
B1	Middle Columbia/Hood	West Fork Hood River	1707010507	31.4	0.0	0.0	A, F, R
B1	Middle Columbia/Hood	Hood River	1707010508	11.6	0.0	0.8	A, C, D, F, R, I, U
B1	Middle Columbia/Hood	White Salmon River	1707010509	2.8	0.1	0.8	A, C, D, F, R, U
B1	Middle Columbia/Hood	Little White Salmon River	1707010510	0.0	0.0	1.6	D, F, R
B1	Middle Columbia/Hood	Wind River	1707010511	19.0	6.2	17.1	F, R, U
B1	Middle Columbia/Hood	Middle Columbia/Grays Creek	1707010512	0.6	0.1	17.2	R, U
B1	Middle Columbia/Hood	Middle Columbia/Eagle Creek	1707010513	2.0	0.2	10.9	D, R, U
B2	Lower Columbia/Sandy	Salmon River	1708000101	15.5	0.0	0.0	F, C, R
B2	Lower Columbia/Sandy	Zigzag River	1708000102	11.6	0.0	4.0	F, C, R
B2	Lower Columbia/Sandy	Upper Sandy River	1708000103	12.7	0.0	0.0	F, R
B2	Lower Columbia/Sandy	Middle Sandy River	1708000104	26.0	0.3	0.0	D, R, U
B2	Lower Columbia/Sandy	Bull Run River	1708000105	6.5	0.0	0.0	D, F, R
B2	Lower Columbia/Sandy	Washougal River	1708000106	10.9	3.7	18.1	C, F, R, S, U, W
B2	Lower Columbia/Sandy	Columbia Gorge Tributaries	1708000107	6.8	10.2	27.9	C, D, F, R, U, W
B2	Lower Columbia/Sandy	Lower Sandy River	1708000108	20.0	4.4	2.4	A, C, F, R, U
B2	Lower Columbia/Sandy	Salmon Creek	1708000109	0.0	0.0	40.8	A, C, F, R, U, W

B3	Lewis	East Fork Lewis River	1708000205	14.9	<0.1	7.4	A, C, F, R, S, U, W
B3	Lewis	Lower Lewis River	1708000206	19.2	18.3	8.2	A, C, D, F, R, U, W
B4	Lower Columbia/ Clatskanie	Kalama River	1708000301	40.1	0.2	13.9	C, F, R, U, W
B4	Lower Columbia/ Clatskanie	Beaver Creek/Columbia River	1708000302	0.0	6.3	0.1	A, C, F, R, U, W
B4	Lower Columbia/ Clatskanie	Clatskanie River	1708000303	8.4	7.2	0.0	A, C, F, R, U, W
B4	Lower Columbia/ Clatskanie	Germany/Abernathy	1708000304	11.5	0.1	37.8	A, C, F, R, U, W
B4	Lower Columbia/ Clatskanie	Skamokawa/ Elochoman	1708000305	11.4	0.4	34.6	A, C, F, R, W
B4	Lower Columbia/ Clatskanie	Plympton Creek	1708000306	1.7	7.2	0.3	A, C, F, R, W
B5	Upper Cowlitz	Headwaters Cowlitz River	1708000401	0.0	0.0	7.5	C, F, R
B5	Upper Cowlitz	Upper Cowlitz River	1708000402	0.0	0.0	13.0	C, F, R
B5	Upper Cowlitz	Cowlitz Valley Frontal	1708000403	0.0	0.0	34.9	A, F, R, U
B5	Upper Cowlitz	Upper Cispus River	1708000404	0.0	0.0	22.1	C, F, R
B5	Upper Cowlitz	Lower Cispus River	1708000405	0.0	0.0	26.8	C, F, R
B6	Lower Cowlitz	Tilton River	1708000501	0.0	0.0	24.6	C, D, F, R, U
B6	Lower Cowlitz	Riffe Reservoir	1708000502	0.0	0.0	6.9	A, C, D, F, R
B6	Lower Cowlitz	Jackson Prairie	1708000503	35.7	0.0	21.9	A, C, D, F, R
B6	Lower Cowlitz	North Fork Toutle River	1708000504	0.0	0.0	0.9	F, R
B6	Lower Cowlitz	Green River	1708000505	26.6	0.0	3.0	F, R
B6	Lower Cowlitz	South Fork Toutle River	1708000506	7.7	0.0	17.7	F, R
B6	Lower Cowlitz	East Willapa	1708000507	8.8	0.0	112.0	A, C, F, R, U, W
B6	Lower Cowlitz	Coweeman	1708000508	14.3	0.0	47.5	A, C, F, R, U, W
B7	Lower Columbia	Youngs River	1708000601	15.3	29.5	4.3	A, C, F, I, R, U, W
B7	Lower Columbia	Big Creek	1708000602	9.8	19.5	0.0	A, C, F, I, R, W
B7	Lower Columbia	Grays Bay	1708000603	4.3	0.2	68.2	C, F, R, W
B8	Middle Willamette	Abernethy Creek	1709000704	0.6	2.6	0.1	A, C, D, R, U
B9	Clackamas	Eagle Creek	1709001105	13.8	3.2	0.0	A, F, R

B9	Clackamas	Lower Clackamas River	1709001106	34.7	2.7	0.0	A, C, D, I, R, U, W
B10	Lower Willamette	Johnson Creek	1709001201	1.2	8.9	0.1	A, C, I, R, U, W
B10	Lower Willamette	Scappoose Creek	1709001202	4.2	49.4	0.0	A, C, F, I, R, U, W
B10	Lower Willamette	Columbia Slough/Willamette River	1709001203	0.0	25.4	0.0	A, C, R, U, W
	Multiple	Lower Columbia River corridor	NA	0.0	121	0.0	C, D, I, R, T, U, W

* Some streams classified as "Presence/Migration Only PCEs" may also include rearing or spawning PCEs, but the GIS data are still undergoing review to confirm species use type.

** This list is not exhaustive. It is intended to highlight key management activities affecting PCEs in each watershed. Activities identified are based on the general categories described by Spence et al. (1996) and summarized previously in the "Special Management Considerations or Protection" section of this report. Coding is as follows: F= forestry, G = grazing, A = agriculture, C = channel modifications/diking, R = road building/maintenance, U = urbanization, S = sand and gravel mining, M = mineral mining, D = dams, I = irrigation impoundments and withdrawals, T = river, estuary, and ocean traffic, W = wetland loss/removal, B = beaver removal, X = exotic/invasive species introductions, H = forage fish/species harvest. Primary sources for this information were the CHART and reports by LCFRB (2003), Subbasin Summary Reports of the NWPPC, and land use/land cover GIS layers from the U.S. Geological Survey.

Table B2. Summary of Initial CHART Scores and Ratings of Conservation Value for Habitat Areas Occupied by the Lower Columbia River Chinook Salmon ESU

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[6]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
B1	Middle Columbia/Hood	East Fork Hood River	1707010506	10	Moderate HUC5 score; habitat relatively more extensive in this HUC5 than in other areas of the Gorge region; this HUC5 historically supported one of just two TRT historical spring-run populations in the Gorge region; area emphasized for supplementation efforts	High
B1	Middle Columbia/Hood	West Fork Hood River	1707010507	8	Moderate HUC5 score; habitat still available and this HUC5 historically supported one of just two TRT historical spring-run populations in the Gorge region; PCEs overlap with a FEMAT key watershed for at-risk anadromous salmonids	High
B1	Middle Columbia/Hood	Hood River	1707010508	9	Moderate HUC5 score; habitat relatively more extensive in this HUC5 than in other areas of the Gorge region; this HUC5 historically supported one of just two spring chinook populations in the Gorge region; HUC5 contains important connectivity reaches for upstream HUC5s (including one containing a FEMAT key watershed for at-risk anadromous salmonids)	High
B1	Middle Columbia/Hood	White Salmon River	1707010509	12	Moderate-high HUC5 score; PCEs limited by Condit Dam but do support a TRT fall-run core population; habitat used by nonnative spring-run fish in a watershed that historically supported one of only two spring chinook populations (including a TRT core population) in the Gorge region	High

[6] PCE/watershed scores were derived using the CHART scoring process described in the introduction to this report.

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[6]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
B1	Middle Columbia/Hood	Little White Salmon River	1707010510	6	Low-moderate HUC5 score; limited PCEs not identified as supporting a demographically independent population, but may provide some spring-run chinook habitat that could promote conservation	Medium
B1	Middle Columbia/Hood	Wind River	1707010511	9	Moderate HUC5 score; habitat still available and this HUC5 supports one of four TRT historical fall-run populations (including a core population) in the Gorge region; passage over Shipherd Falls provides access to relatively extensive spring-run habitat for the Gorge region; PCEs overlap with a FEMAT key watershed for at-risk anadromous salmonids	High
B1	Middle Columbia/Hood	Middle Columbia/Grays Creek	1707010512	7	Moderate HUC5 score; PCEs limited in this HUC5 and likely always were due to gradient barriers and small drainage size; HUC5 supports a TRT historical core fall-run population but production likely low in this HUC5; mainstem Columbia River is high value connectivity corridor	Medium
B1	Middle Columbia/Hood	Middle Columbia/Eagle Creek	1707010513	8	Moderate HUC5 score; PCEs in tributary habitat in HUC5 supports two TRT historical core fall-run populations; mainstem Columbia River is high value connectivity corridor	High
B2	Lower Columbia/Sandy	Salmon River	1708000101	15	Highest HUC5 score for entire ESU; extensive PCEs support spring-, fall, and late fall-run populations; TRT identified spring- and late fall-runs as core and genetic legacy populations; PCEs overlap with a FEMAT key watershed for at-risk anadromous salmonids	High

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[6]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
B2	Lower Columbia/Sandy	Zigzag River	1708000102	15	Highest HUC5 score for entire ESU; extensive PCEs support spring-, fall, and late fall-run populations; TRT identified spring- and late fall-runs as core and genetic legacy populations	High
B2	Lower Columbia/Sandy	Upper Sandy River	1708000103	15	Highest HUC5 score for entire ESU; extensive PCEs support spring-, fall, and late fall-run populations; TRT identified spring- and late fall-runs as core and genetic legacy populations	High
B2	Lower Columbia/Sandy	Middle Sandy River	1708000104	14	High HUC5 score; extensive PCEs support spring-, fall, and late fall-run populations; TRT identified spring- and late fall-runs as core and genetic legacy populations; HUC5 contains important connectivity reaches for upstream HUC5s (including one containing a FEMAT key watershed for at-risk anadromous salmonids)	High
B2	Lower Columbia/Sandy	Bull Run River	1708000105	12	Moderate-high HUC5 score; PCEs more limited due to dams in this HUC5, but still support TRT core spring- and fall-run fish; the CHART also concluded that inaccessible reaches above the Bull Run Dam complex in this HUC5 may be essential to the conservation of the ESU.	High
B2	Lower Columbia/Sandy	Washougal River	1708000106	10	Moderate HUC5 score; not identified as a core or genetic legacy population by TRT; other HUC5s supporting fall-run fish likely to have higher conservation value in the Cascade region	Medium

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[6]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
B2	Lower Columbia/Sandy	Columbia Gorge Tributaries	1708000107	11	Moderate-high HUC5 score; tributary habitat in HUC5 supports at least one TRT historical core fall-run population and habitat in this HUC5 likely more important for this population than the upstream HUC5; mainstem Columbia River is high value connectivity corridor supporting all upstream populations.	High
B2	Lower Columbia/Sandy	Lower Sandy River	1708000108	12	Moderate-high HUC5 score; PCEs support spring-, fall, and late fall-run populations; TRT identified spring- and late fall-runs as core and genetic legacy populations; important connectivity reaches for all upstream HUC5s	High
B2	Lower Columbia/Sandy	Salmon Creek	1708000109	8	Moderate HUC5 score; PCEs limited and degraded in this HUC5; not identified as a core population; TRT genetic legacy classification not likely attributable to fish in this HUC5; other HUC5s supporting fall-run fish likely to have higher conservation value in the Cascade region	Low
B3	Lewis	Upper Lewis River	1708000201	*	Unoccupied HUC5, but population expansion into this HUC5 possibly essential for conservation; nearly the entire area is a FEMAT key watershed for at-risk anadromous salmonids	Possibly High
B3	Lewis	Muddy River	1708000202	*	Unoccupied HUC5, but population expansion into this HUC5 possibly essential for conservation; nearly the entire area is a FEMAT key watershed for at-risk anadromous salmonids	Possibly High

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[6]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
B3	Lewis	Swift Reservoir	1708000203	*	Unoccupied HUC5, but population expansion into this HUC5 possibly essential for conservation; HUC5 contains connectivity reaches to upstream to upstream areas that are FEMAT key watersheds for at-risk anadromous salmonids	Possibly High
B3	Lewis	Yale Reservoir	1708000204	*	Unoccupied HUC5, but population expansion into this HUC5 possibly essential for conservation; HUC5 contains connectivity reaches to upstream to upstream areas that are FEMAT key watersheds for at-risk anadromous salmonids	Possibly High
B3	Lewis	East Fork Lewis River	1708000205	13	Moderate-high HUC5 score; PCEs support fall-run fish and TRT identified HUC5 as supporting a genetic legacy population; some of best remaining habitat of three HUC5s supporting this population; uppermost areas are a FEMAT key watershed for at-risk anadromous salmonids	High
B3	Lewis	Lower Lewis River	1708000206	12	Moderate-high HUC5 score; PCEs support all run types in this ESU (spring-, fall-, and late fall-run fish); TRT identified HUC5 as supporting core and genetic legacy populations; conservation of these PCEs will be especially important if historical habitats upstream are made accessible.	High
B4	Lower Columbia/ Clatskanie	Kalama River	1708000301	11	Moderate-high HUC5 score; supports spring- and fall-run populations; not identified as a core or genetic legacy population by TRT; CHART uncertain of rarity/importance in this HUC5 but believed that other HUC5s may have higher conservation value in the Cascade region	Medium

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[6]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
B4	Lower Columbia/ Clatskanie	Beaver Creek/Columbia River	1708000302	4	Low-moderate HUC5 score but lowest in Coast Range region; TRT identified two historical fall-run populations in this HUC5 but present distribution limited to Clatskanie River population's historic range; PCEs are extremely limited in this HUC5 relative to others in the Coast Range region and may have very limited potential for improvement	Low
B4	Lower Columbia/ Clatskanie	Clatskanie River	1708000303	10	Moderate HUC5 score; PCE's support a TRT fall-run population but it is neither a core nor legacy population	Medium
B4	Lower Columbia/ Clatskanie	Germany/Abernathy	1708000304	10	Moderate HUC5 score; PCEs support entire range of a TRT fall-run population but it is neither a core nor legacy population; other HUC5s supporting fall-run fish likely to have higher conservation value in the Coast Range region	Medium
B4	Lower Columbia/ Clatskanie	Skamokawa/ Elochoman	1708000305	12	Moderate-high HUC5 score, highest in Coast Range region; PCEs support entire range of a TRT fall-run and core population	High
B4	Lower Columbia/ Clatskanie	Plympton Creek	1708000306	10	Moderate HUC5 score; PCE's support a fall-run TRT population (but neither a core nor legacy population); may have best potential for PCE improvement of the three HUC5s supporting this population	High

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[6]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
B5	Upper Cowlitz	Headwaters Cowlitz River	1708000401	11	Moderate-high HUC5 score; PCEs support spring- and fall-run fish via trap and haul; CHART believed it was important to emphasize conservation value of upper Cowlitz/Cispus HUC5s due to their historic importance and potential to promote conservation of the ESU (i.e., Upper Cowlitz River identified by TRT as a core and genetic legacy spring-run population)	High
B5	Upper Cowlitz	Upper Cowlitz River	1708000402	13	Moderate-high HUC5 score; PCEs support spring- and fall-run fish via trap and haul; CHART believed it was important to emphasize conservation value of upper Cowlitz/Cispus HUC5s due to their historic importance and potential to promote conservation of the ESU (i.e., Upper Cowlitz River identified by TRT as a core and genetic legacy spring-run population); HUC5 includes a FEMAT key watershed for at-risk anadromous salmonids	High
B5	Upper Cowlitz	Cowlitz Valley Frontal	1708000403	13	Moderate-high HUC5 score; PCEs support spring- and fall-run fish via trap and haul; CHART believed it was important to emphasize conservation value of upper Cowlitz/Cispus HUC5s due to their historic importance and potential to promote conservation of the ESU (i.e., Upper Cowlitz River identified by TRT as a core and genetic legacy spring-run population)	High

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[6]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
B5	Upper Cowlitz	Upper Cispus River	1708000404	13	Moderate-high HUC5 score; PCEs support spring- and fall-run fish via trap and haul; CHART believed it was important to emphasize conservation value of upper Cowlitz/Cispus HUC5s due to their historic importance and potential to promote conservation of the ESU (i.e., Cispus River identified by TRT as a core spring-run population)	High
B5	Upper Cowlitz	Lower Cispus River	1708000405	14	High HUC5 score; PCEs support spring- and fall-run fish via trap and haul; CHART believed it was important to emphasize conservation value of upper Cowlitz/Cispus HUC5s due to their historic importance and potential to promote conservation of the ESU (i.e., Cispus River identified by TRT as a core spring-run population)	High
B6	Lower Cowlitz	Tilton River	1708000501	10	Moderate HUC5 score; PCEs support spring- and fall-run fish via trap and haul; HUC5 is only habitat for a TRT historical spring-run population	Medium
B6	Lower Cowlitz	Riffe Reservoir	1708000502	11	Moderate-high HUC5 score; PCEs support spring- and fall-run fish via trap and haul; PCEs degraded due to inundation; HUC5 primarily important as rearing/migration corridor for upstream populations	High
B6	Lower Cowlitz	Jackson Prairie	1708000503	11	Moderate-high HUC5 score; PCEs support fall- and spring-run TRT populations (both core and legacy); some spawning PCEs in this HUC5; important as a high value rearing/migration corridor connecting upstream HUC5s/populations with the ocean	Medium

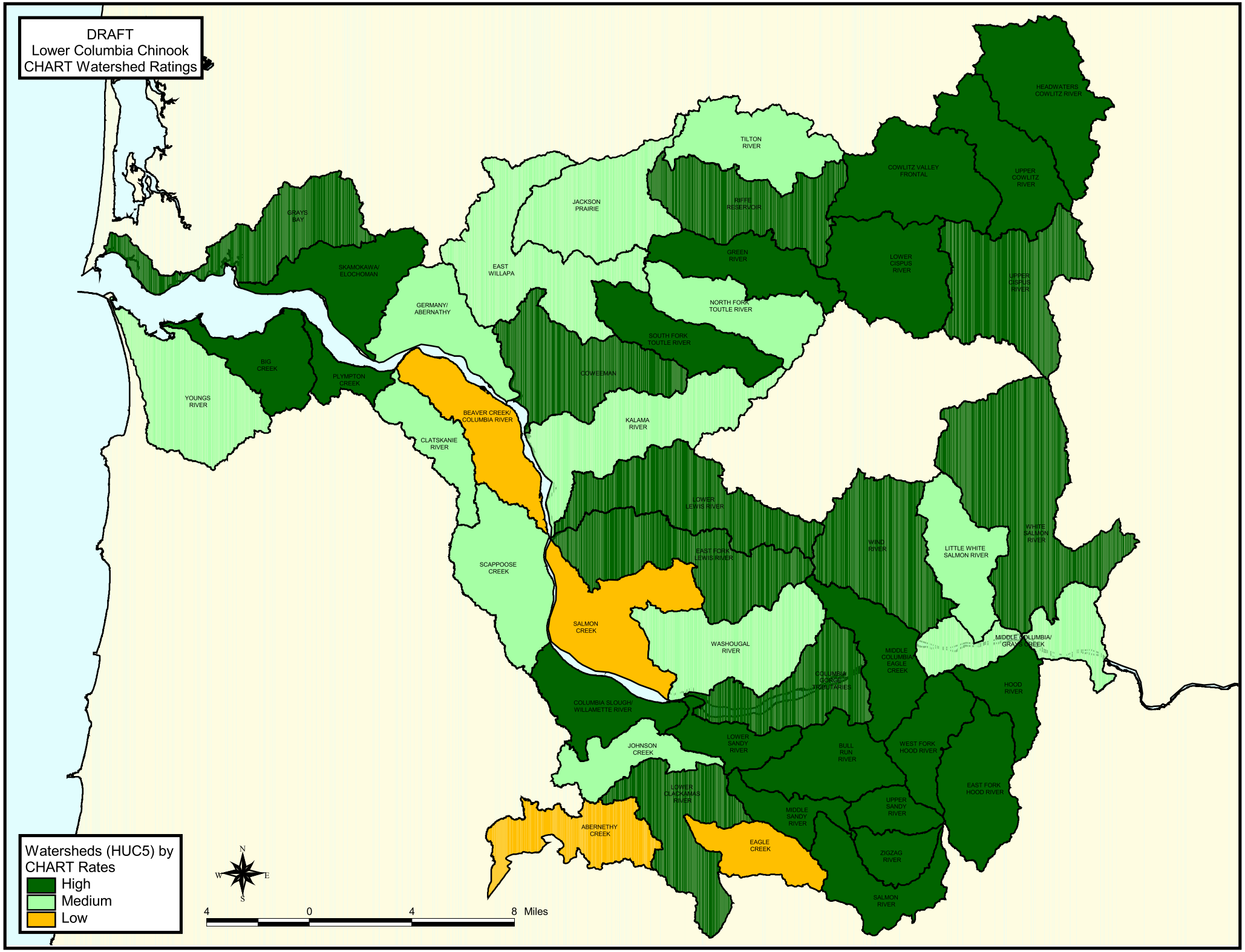
Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[6]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
B6	Lower Cowlitz	North Fork Toutle River	1708000504	10	Moderate HUC5 score; PCEs support a spring- and fall-run TRT population (and the latter is a core population); PCEs in this HUC5 are very limited relative to the other three HUC5s supporting these populations; CHART noted recolonization of area despite volcano-related impacts on PCEs	Medium
B6	Lower Cowlitz	Green River	1708000505	12	Moderate-high HUC5 score; PCEs support a spring- and fall-run TRT population (and the latter is a core population); most of the spawning PCEs for this population may be in this HUC5; CHART noted recolonization of area despite volcano-related impacts on PCEs	High
B6	Lower Cowlitz	South Fork Toutle River	1708000506	12	Moderate-high HUC5 score; PCEs support a spring- and fall-run TRT population (and the latter is a core population); extensive spawning PCEs for this population in this HUC5; CHART noted recolonization of area despite volcano-related impacts on PCEs	High
B6	Lower Cowlitz	East Willapa	1708000507	11	Moderate-high HUC5 score; PCEs support fall- and spring-run TRT populations (both core and legacy); some spawning PCEs and important as a high value rearing/migration corridor connecting upstream HUC5s/populations with the ocean	Medium
B6	Lower Cowlitz	Coweeman	1708000508	14	High HUC5 score; PCEs support a TRT genetic legacy fall-run population as well as rearing/migration for all upriver populations (fall- and spring-run) in the Cowlitz River; one of few remaining populations in ESU sustained through natural production	High

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[6]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
B7	Lower Columbia	Youngs River	1708000601	11	Moderate-high HUC5 score; PCEs support entire range of a TRT fall-run population but it is neither a core nor legacy population; CHART noted extensive releases of out-of-ESU fish in this HUC5 and believed that other HUC5s supporting fall-run fish are likely to have higher conservation value in the Coast Range region	Medium
B7	Lower Columbia	Big Creek	1708000602	10	Moderate HUC5 score; PCEs support entire range of a TRT fall-run and core population	High
B7	Lower Columbia	Grays Bay	1708000603	11	Moderate-high HUC5 score; PCEs support entire range of a TRT fall-run population but it is neither a core nor legacy population; CHART noted that relatively extensive PCEs in this HUC5 may be indicative of higher conservation value in the Coast Range region	High
B8	Middle Willamette	Abernethy Creek	1709000704	8	Moderate HUC5 score; extremely limited PCEs and HUC5 not associated with a TRT population (but possibly the Clackamas River fall-run)	Low
B9	Clackamas	Eagle Creek	1709001105	8	Moderate HUC5 score; PCEs support a TRT fall-run and core population but are very limited in this HUC5	Low
B9	Clackamas	Lower Clackamas River	1709001106	11	Moderate-high HUC5 score; PCEs support a TRT fall-run and core population; this HUC5 is the primary production area for this population	High

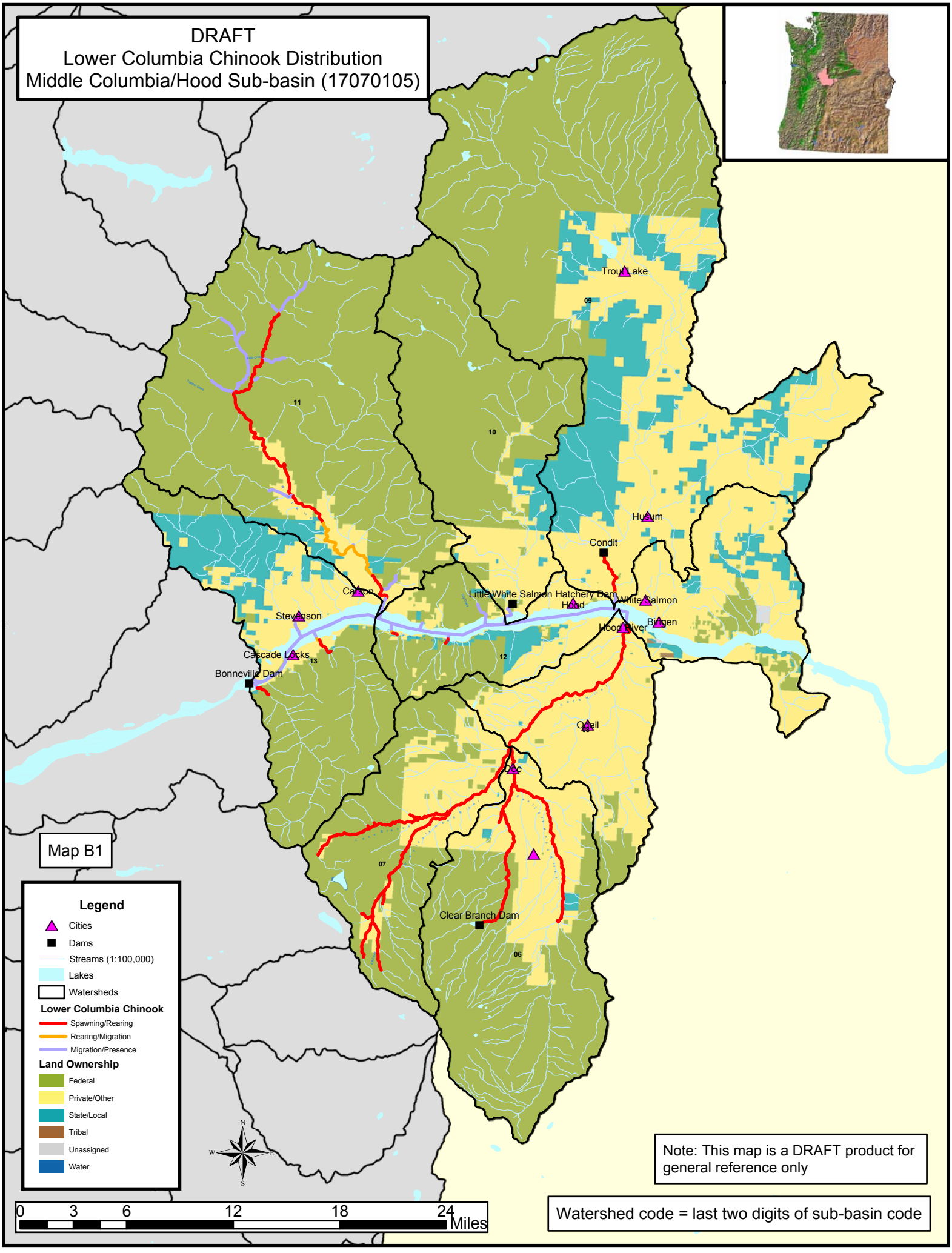
Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[6]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
B10	Lower Willamette	Johnson Creek	1709001201	10	Moderate HUC5 score; PCEs support a TRT fall-run and core population; PCE quality degraded but CHART noted that HUC5 may provide important refuge habitat for Clackamas River population and may warrant consideration for unique adaptations; Willamette River is a high value rearing/migration corridor	Medium
B10	Lower Willamette	Scappoose Creek	1709001202	9	Moderate HUC5 score; PCEs support at least two populations, including a TRT fall-run and core population; PCE quality degraded but CHART noted that HUC5 may provide important refuge habitat for Clackamas River population and may warrant consideration for unique adaptations; Willamette River (Multnomah Channel) is a high value rearing/migration corridor	Medium
B10	Lower Willamette	Columbia Slough/Willamette River	1709001203	11	Moderate-high HUC5 score; PCEs support a TRT fall-run and core population and likely support rearing/migration for other Columbia River populaions in the ESU; PCE quality degraded but CHART noted that HUC5 may provide important refuge habitat for Clackamas River population and may warrant consideration for unique adaptations; Willamette River is a high value rearing/migration corridor	High
	Multiple	Lower Columbia River corridor	NA	NA	Area not scored since many reaches are outside HUC5 boundaries. However, the CHART concluded that rearing and migration PCEs throughout this corridor are highly essential to ESU conservation	High

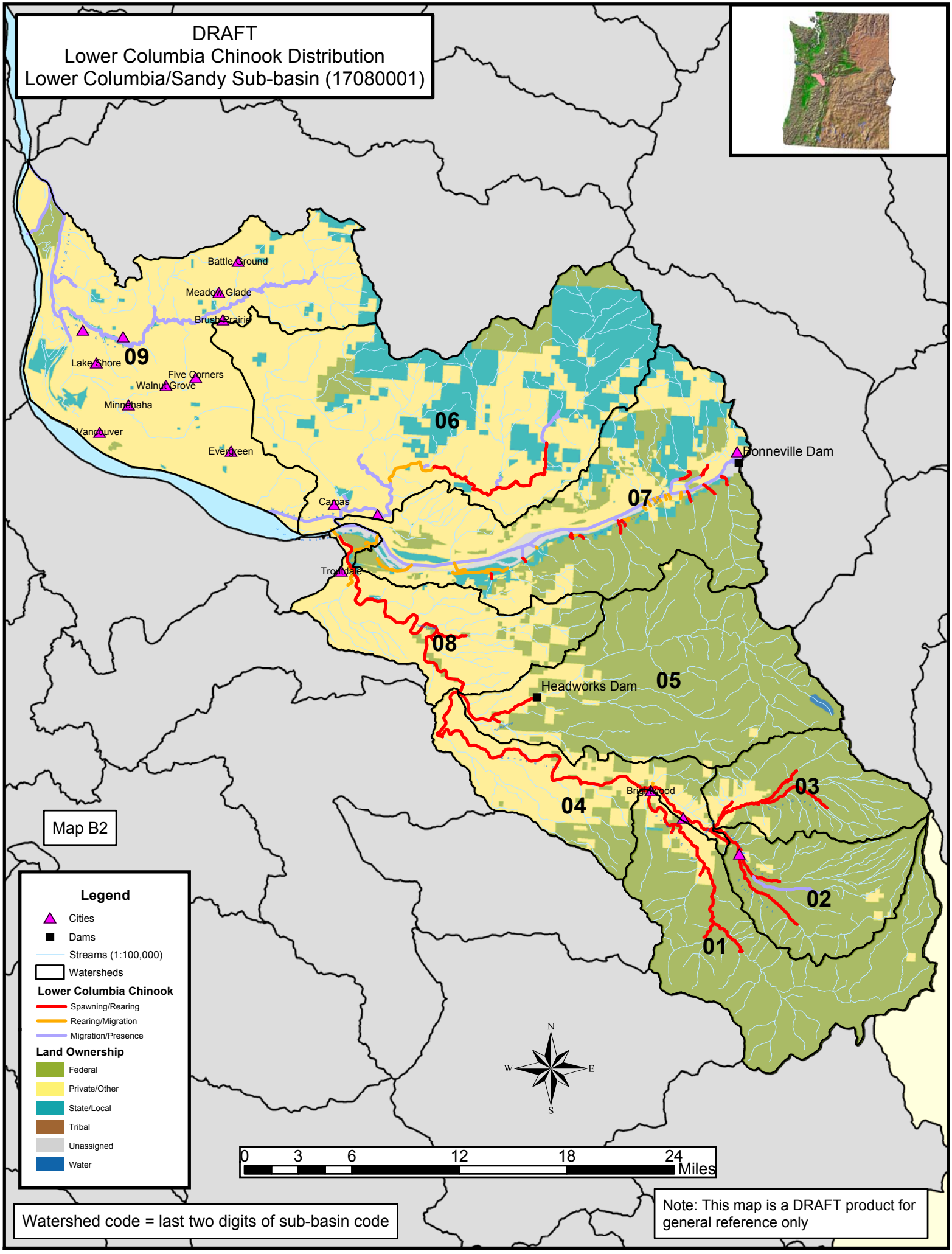
* Rated by CHART although HUC5 is currently blocked and unoccupied

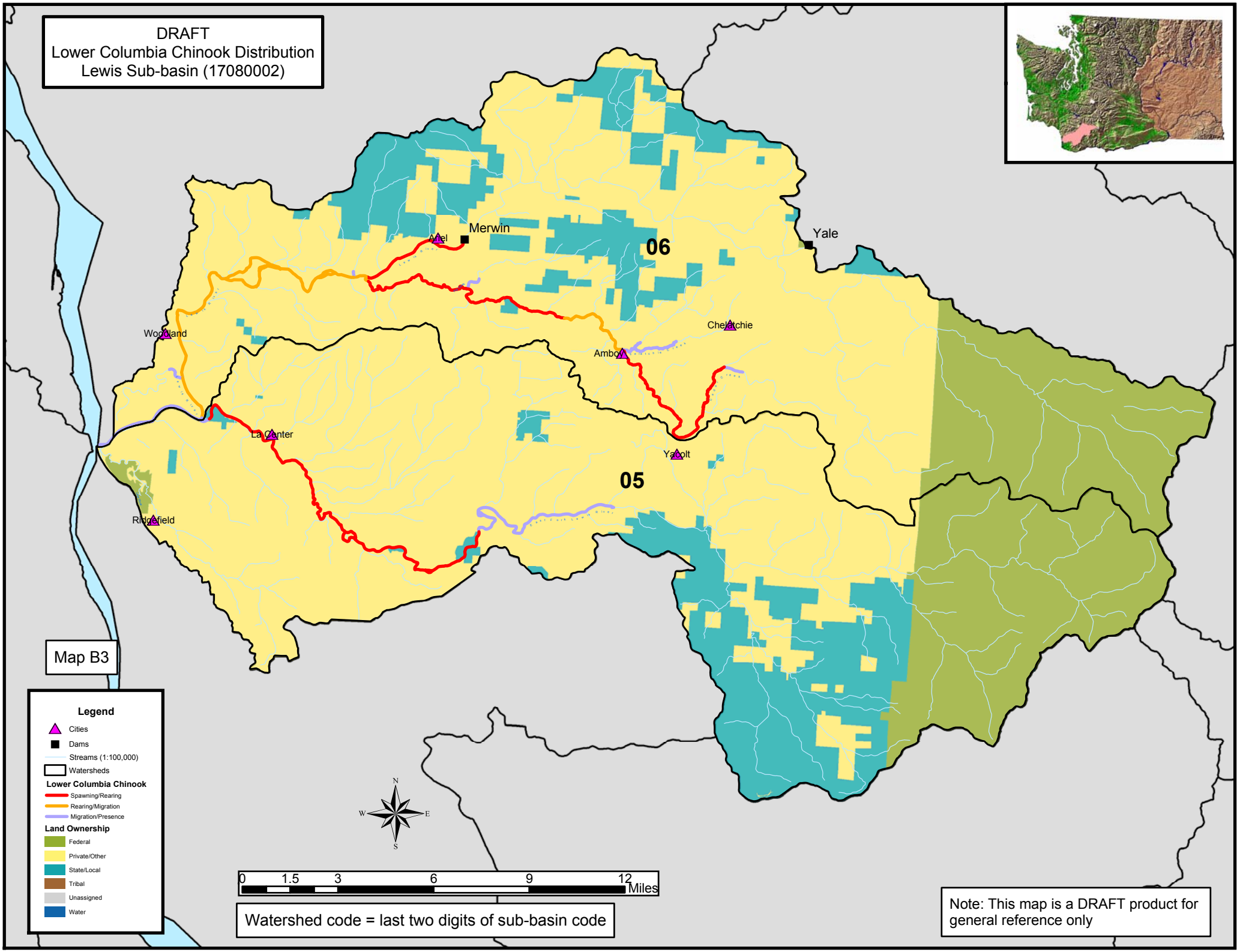
Figure B1. Initial CHART Ratings of Conservation Value for Habitat Areas in HUC5 Watersheds Occupied by the Lower Columbia River Chinook Salmon ESU

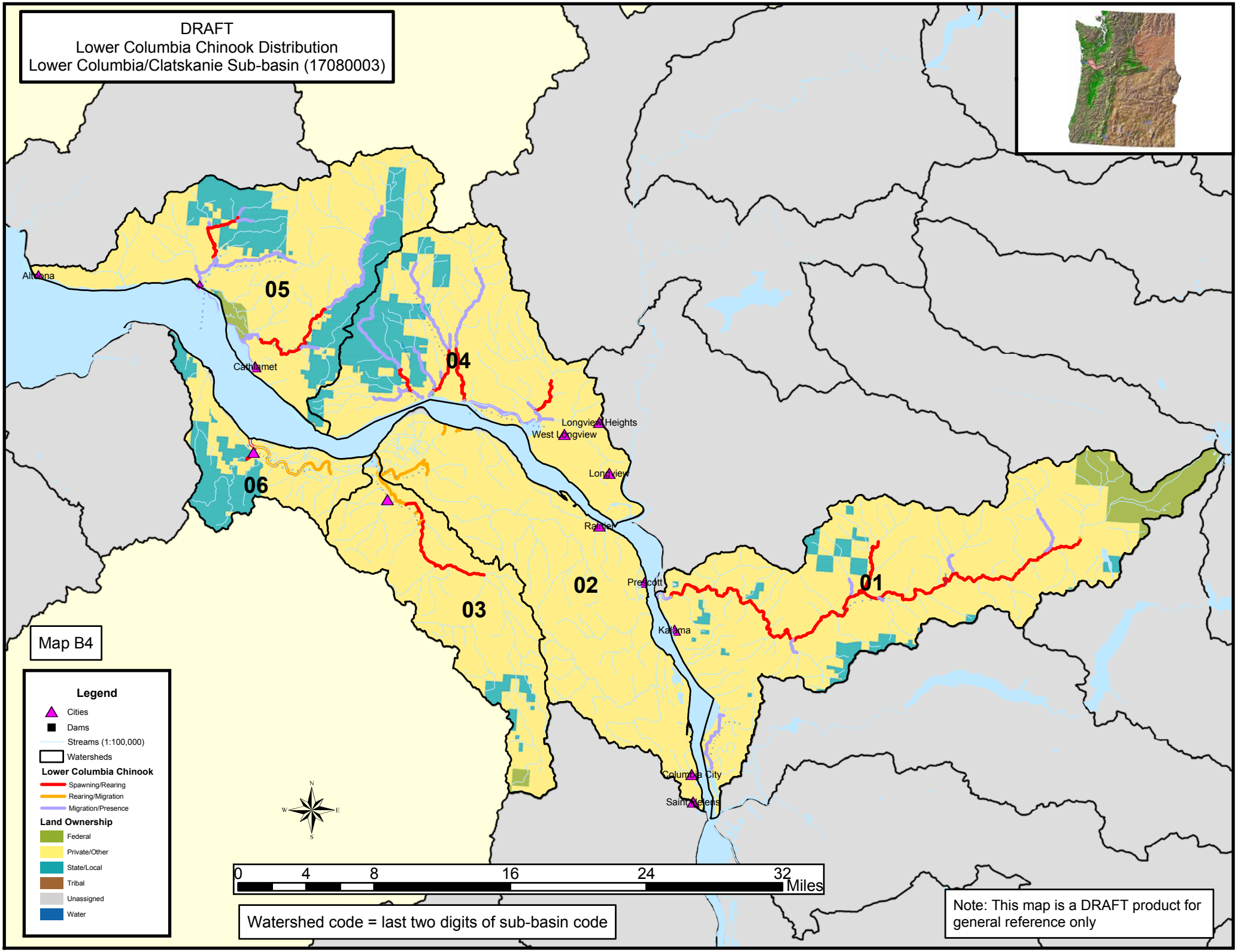

DRAFT
Lower Columbia Chinook
CHART Watershed Ratings
GRAYS BAY
SKAMOKAWA/ ELOCHOMAN
JACKSON PRAIRIE
EAST WILLAPA
TILTON RIVER
PEPPE RESERVOIR
COWLITZ VALLEY FRONTAL
HEADWATERS COWLITZ RIVER
UPPER COWLITZ RIVER
GREEN RIVER
LOWER CISPUS RIVER
UPPER CISPUS RIVER
NORTH FORK TOUTLE RIVER
SOUTH FORK TOUTLE RIVER
GERMANY/ ABERNATHY
COWEEMAN
BIG CREEK
PLYMPTON CREEK
YOUNGS RIVER
BEAVER CREEK/ COLUMBIA RIVER
KALAMA RIVER
CLATSKANIE RIVER
LOWER LEWIS RIVER
EAST FORK LEWIS RIVER
SCAPPOOSE CREEK
SALMON CREEK
WASHOUGAL RIVER
WIND RIVER
LITTLE WHITE SALMON RIVER
WHITE SALMON RIVER
MIDDLE COLUMBIA/ GRAYS CREEK
MIDDLE COLUMBIA EAGLE CREEK
COLUMBIA GORGE TRIBUTARIES
HOOD RIVER
COLUMBIA SLOUGH/ WILLAMETTE RIVER
JOHNSON CREEK
LOWER SANDY RIVER
BULL RUN RIVER
WEST FORK HOOD RIVER
EAST FORK HOOD RIVER
LOWER CLACKAMAS RIVER
MIDDLE SANDY RIVER
UPPER SANDY RIVER
ABERNETHY CREEK
EAGLE CREEK
ZIGZAG RIVER
SALMON RIVER
Watersheds (HUC5) by CHART Rates
High
Medium
Low
N
W
E
S
4
0
4
8 Miles

Maps B1 through B10. Lower Columbia River Chinook Salmon ESU – Habitat Areas Under Consideration for Critical Habitat Designation (note: the lower Columbia River corridor is not shown but is under consideration as described in the text)

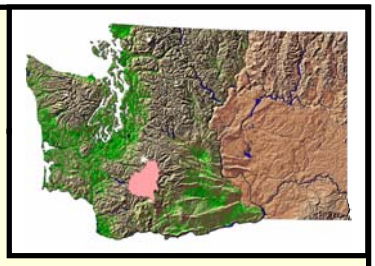

DRAFT
Lower Columbia Chinook Distribution
Middle Columbia/Hood Sub-basin (17070105)
Trout Lake
09
11
10
Husum
Condit
Carson
Little White Salmon Hatchery Dam
Hood
White Salmon
Stevenson
Bingen
Hood River
Cascade Locks
13
12
Bonneville Dam
Odell
08
Dee
07
Clear Branch Dam
06
Map B1
Legend
Cities
Dams
Streams (1:100,000)
Lakes
Watersheds
Lower Columbia Chinook
Spawning/Rearing
Rearing/Migration
Migration/Presence
Land Ownership
Federal
Private/Other
State/Local
Tribal
Unassigned
Water
N
W
E
S
0 3 6 12 18 24
Miles
Note: This map is a DRAFT product for general reference only
Watershed code = last two digits of sub-basin code


DRAFT
Lower Columbia Chinook Distribution
Lower Columbia/Sandy Sub-basin (17080001)
Battle Ground
Meadow Glade
Brush Prairie
Lake Shore
Five Corners
Walnut Grove
Minnehaha
Vancouver
Evergreen
Camas
Troutdale
Bonneville Dam
Headworks Dam
Bridal Veil
09
06
07
08
05
04
03
02
01
Map B2
Legend
Cities
Dams
Streams (1:100,000)
Watersheds
Lower Columbia Chinook
Spawning/Rearing
Rearing/Migration
Migration/Presence
Land Ownership
Federal
Private/Other
State/Local
Tribal
Unassigned
Water
N
W
E
S
0 3 6 12 18 24
Miles
Watershed code = last two digits of sub-basin code
Note: This map is a DRAFT product for general reference only


DRAFT
Lower Columbia Chinook Distribution
Lewis Sub-basin (17080002)
Merwin
Ariel
Yale
06
Woodland
Chelatchie
Amboy
La Center
Yacolt
05
Ridgefield
Map B3
Legend
Cities
Dams
Streams (1:100,000)
Watersheds
Lower Columbia Chinook
Spawning/Rearing
Rearing/Migration
Migration/Presence
Land Ownership
Federal
Private/Other
State/Local
Tribal
Unassigned
Water
N
W
E
S
0 1.5 3 6 9 12
Miles
Watershed code = last two digits of sub-basin code
Note: This map is a DRAFT product for general reference only


DRAFT
Lower Columbia Chinook Distribution
Lower Columbia/Clatskanie Sub-basin (17080003)
Altoona
Cathlamet
Longview Heights
West Longview
Longview
Rainier
Prescott
Kalama
Columbia City
Saint Helens
05
04
06
03
02
01
Map B4
Legend
Cities
Dams
Streams (1:100,000)
Watersheds
Lower Columbia Chinook
Spawning/Rearing
Rearing/Migration
Migration/Presence
Land Ownership
Federal
Private/Other
State/Local
Tribal
Unassigned
Water
N
W
E
S
0 4 8 16 24 32
Miles
Watershed code = last two digits of sub-basin code
Note: This map is a DRAFT product for general reference only

DRAFT
Lower Columbia Chinook Distirbution
Upper Cowlitz Sub-basin (17080004)



01
02
03
04
05

Packwood
Randle
Silver Creek
Cowlitz River
Cispus River
North Fork Cispus River
Yellowjacket Creek

Map B5

Legend

- Cities
- Dams
- Lakes
- Streams (1:100,000)
- Watersheds

Lower Columbia Chinook

- Spawning/Rearing
- Rearing/Migration
- Migration/Presence

Land Ownership

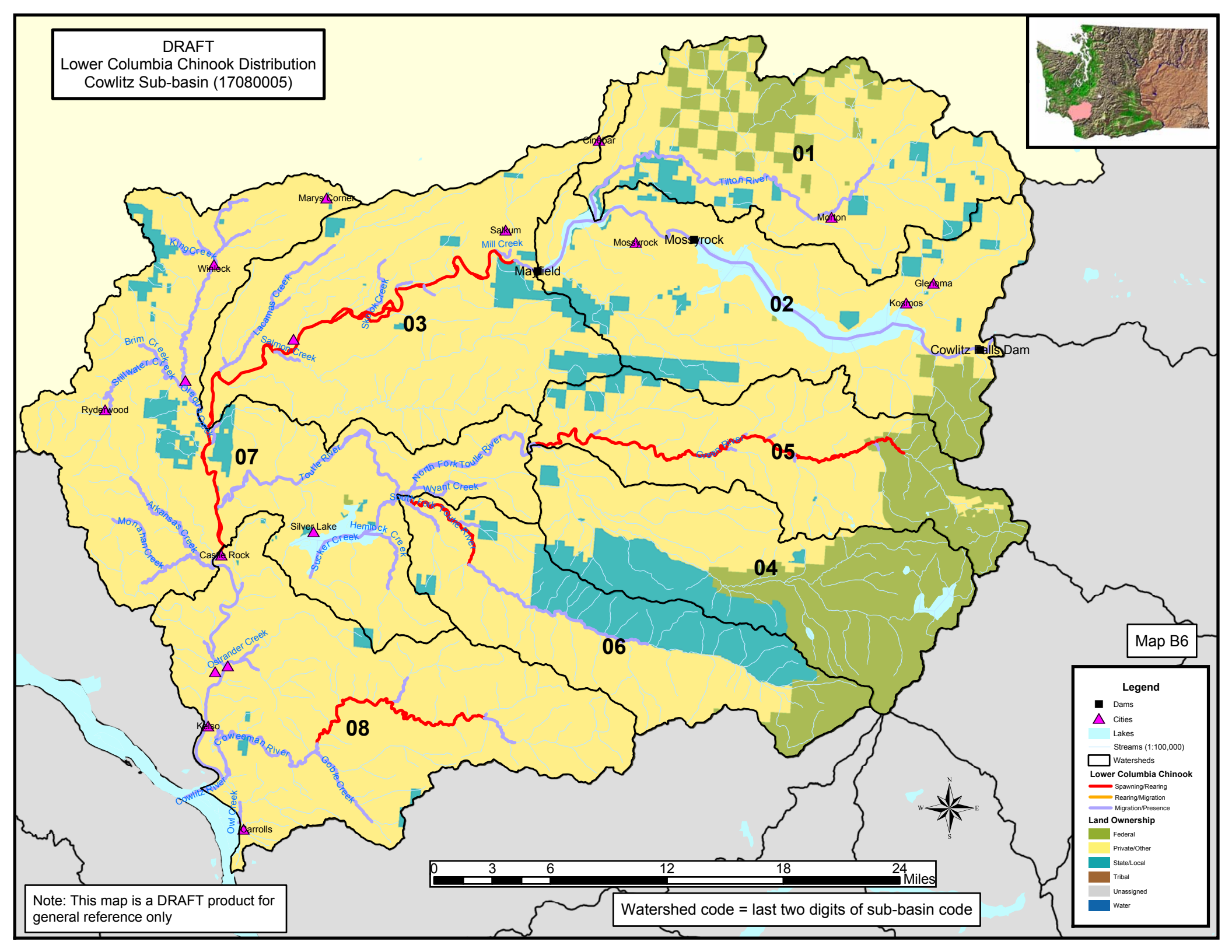
- Federal
- Private/Other
- State/Local
- Tribal
- Unassigned
- Water

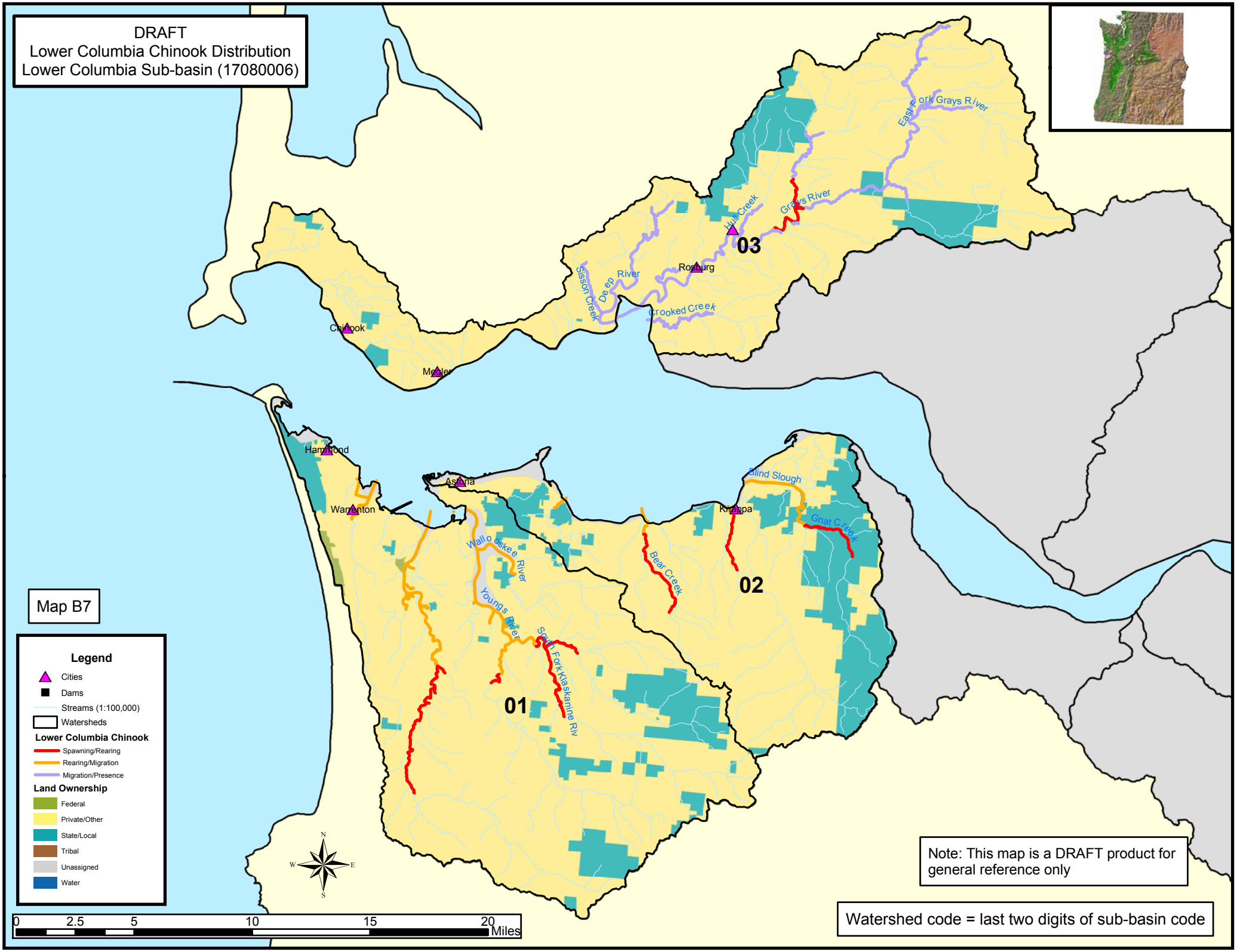
N
W
E
S

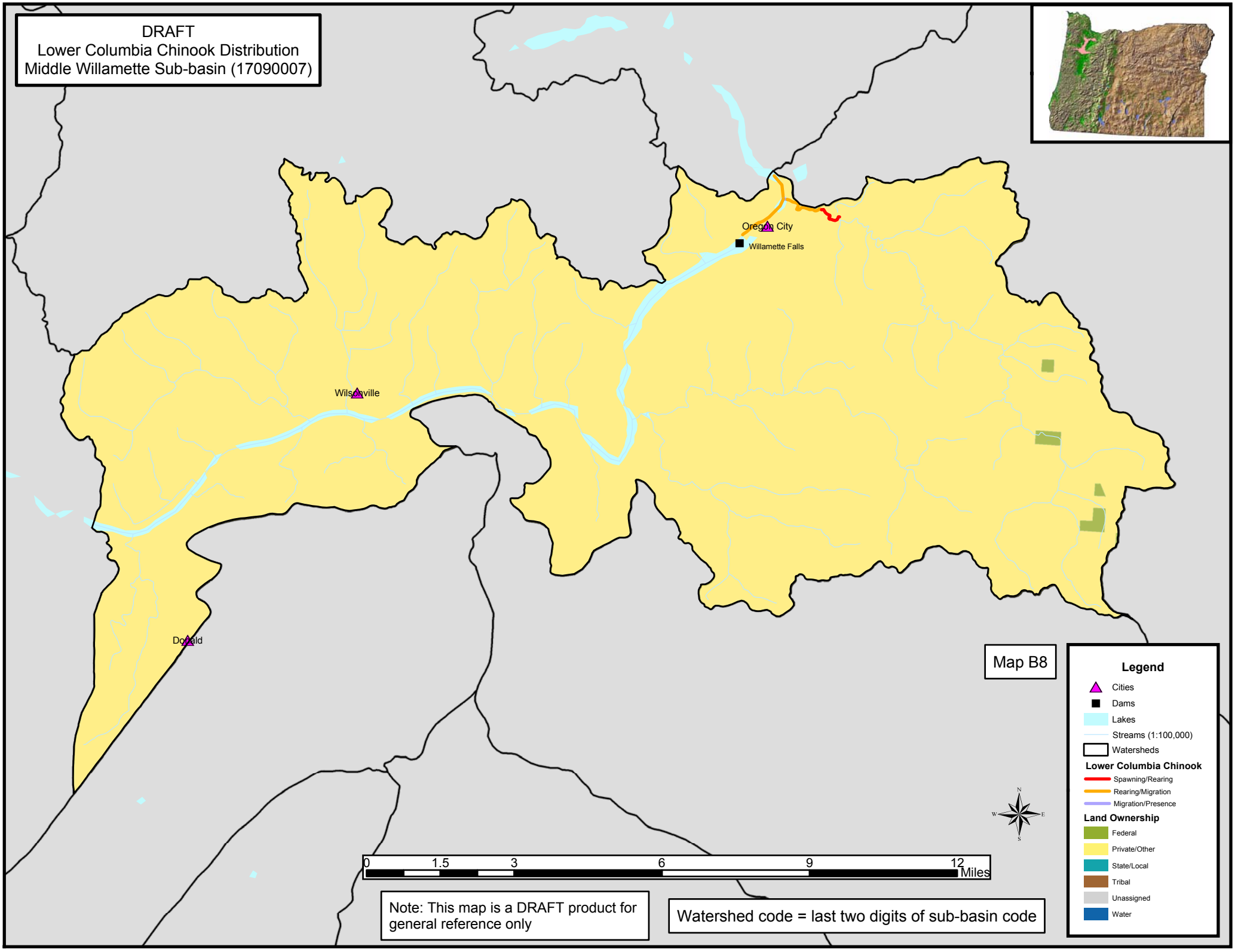
0 3 6 12 18 24 Miles

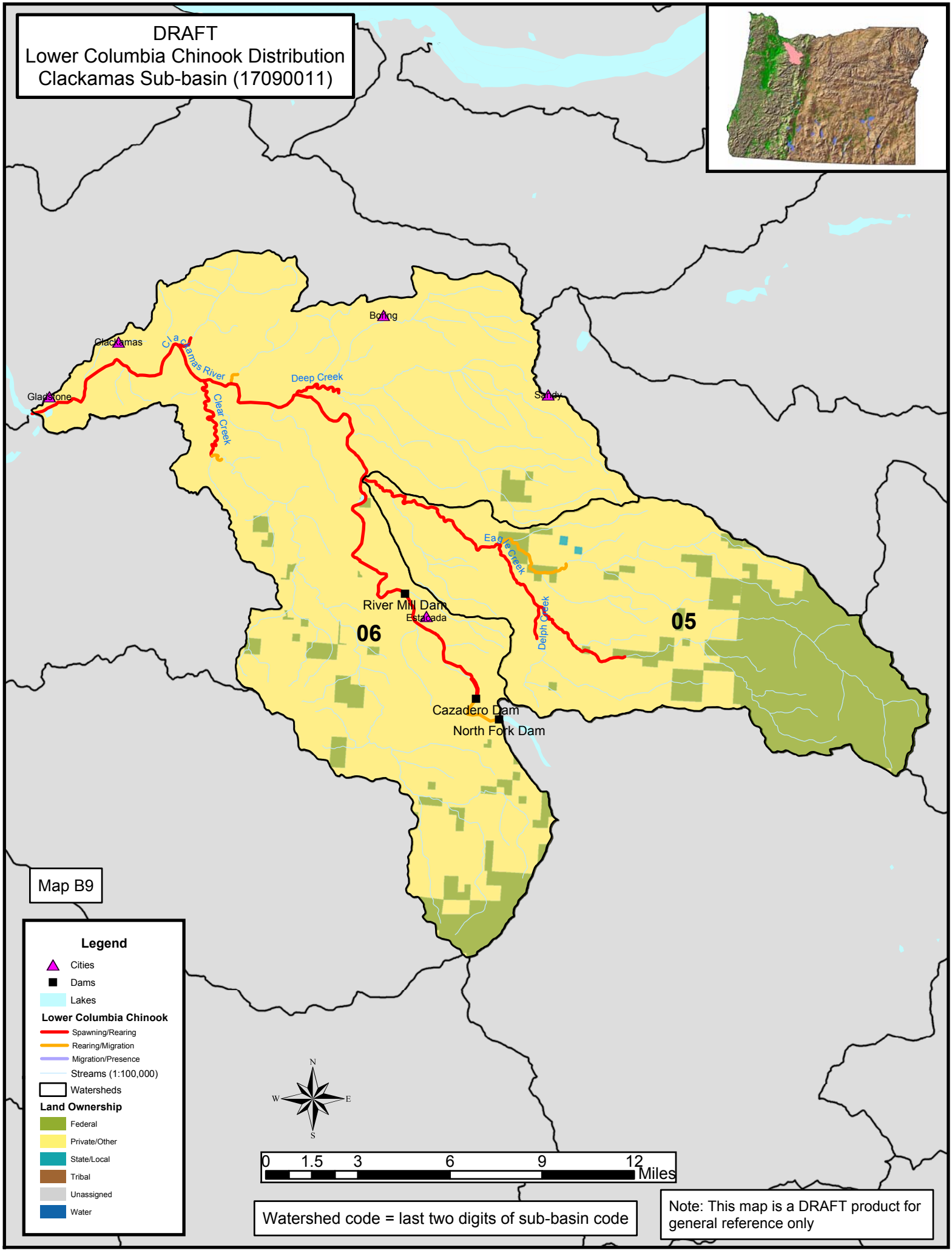
Watershed code = last two digits of sub-basin code

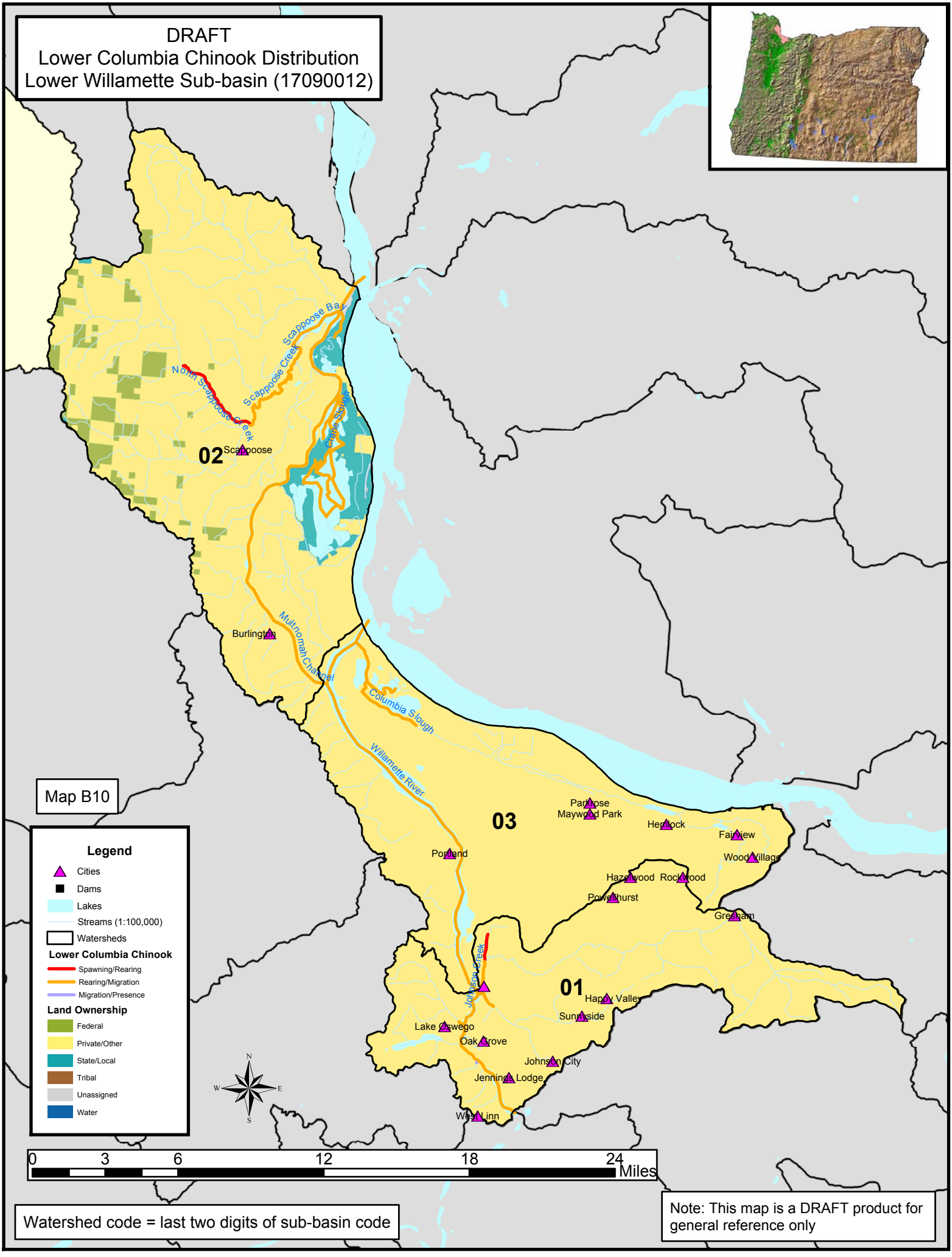
Note: This map is a DRAFT product for general reference only


DRAFT
Lower Columbia Chinook Distribution
Cowlitz Sub-basin (17080005)
01
02
03
04
05
06
07
08
Cinnabar
Tilton River
Morton
Mossyrock
Mayfield
Mill Creek
Salkum
Marys Corner
King Creek
Winlock
Skook Creek
Lacamas Creek
Salmon Creek
Brim Creek
Stillwater Creek
Olequa Creek
Rydenwood
Cowlitz Falls Dam
Glenoma
Kosmos
Toutle River
North Fork Toutle River
Wyant Creek
Silver Lake
Hemlock Creek
Sucker Creek
Castle Rock
Arkansas Creek
Monahan Creek
Ostrander Creek
Kelso
Coweeman River
Goble Creek
Cowlitz River
Owl Creek
Carrolls
Map B6
Legend
Dams
Cities
Lakes
Streams (1:100,000)
Watersheds
Lower Columbia Chinook
Spawning/Rearing
Rearing/Migration
Migration/Presence
Land Ownership
Federal
Private/Other
State/Local
Tribal
Unassigned
Water
0 3 6 12 18 24
Miles
Note: This map is a DRAFT product for general reference only
Watershed code = last two digits of sub-basin code


DRAFT
Lower Columbia Chinook Distribution
Lower Columbia Sub-basin (17080006)
Map B7
Legend
Cities
Dams
Streams (1:100,000)
Watersheds
Lower Columbia Chinook
Spawning/Rearing
Rearing/Migration
Migration/Presence
Land Ownership
Federal
Private/Other
State/Local
Tribal
Unassigned
Water
03
02
01
Chinook
Megler
Hammond
Astoria
Warrenton
Roseburg
Hull Creek
Grays River
East Fork Grays River
Deep River
Sisson Creek
Crooked Creek
Wallooskee River
Youngs River
South Fork Klaskanine Riv
Bear Creek
Knappa
Blind Slough
Gnat Creek
N
S
E
W
0
2.5
5
10
15
20
Miles
Note: This map is a DRAFT product for general reference only
Watershed code = last two digits of sub-basin code


DRAFT
Lower Columbia Chinook Distribution
Middle Willamette Sub-basin (17090007)
Oregon City
Willamette Falls
Wilsonville
Donald
Map B8
Legend
Cities
Dams
Lakes
Streams (1:100,000)
Watersheds
Lower Columbia Chinook
Spawning/Rearing
Rearing/Migration
Migration/Presence
Land Ownership
Federal
Private/Other
State/Local
Tribal
Unassigned
Water
0 1.5 3 6 9 12 Miles
Note: This map is a DRAFT product for general reference only
Watershed code = last two digits of sub-basin code


DRAFT
Lower Columbia Chinook Distribution
Clackamas Sub-basin (17090011)
Boring
Clackamas
Clackamas River
Gladstone
Deep Creek
Clear Creek
Sandy
Eagle Creek
Delph Creek
River Mill Dam
Estacada
06
05
Cazadero Dam
North Fork Dam
Map B9
Legend
Cities
Dams
Lakes
Lower Columbia Chinook
Spawning/Rearing
Rearing/Migration
Migration/Presence
Streams (1:100,000)
Watersheds
Land Ownership
Federal
Private/Other
State/Local
Tribal
Unassigned
Water
N
W
E
S
0 1.5 3 6 9 12
Miles
Watershed code = last two digits of sub-basin code
Note: This map is a DRAFT product for general reference only


DRAFT
Lower Columbia Chinook Distribution
Lower Willamette Sub-basin (17090012)
Map B10
Legend
Cities
Dams
Lakes
Streams (1:100,000)
Watersheds
Lower Columbia Chinook
Spawning/Rearing
Rearing/Migration
Migration/Presence
Land Ownership
Federal
Private/Other
State/Local
Tribal
Unassigned
Water
02
03
01
Scappoose
Burlington
Portland
Parkrose
Maywood Park
Hemlock
Fairview
Wood Village
Hazelwood
Rockwood
Powellhurst
Gresham
Happy Valley
Sunnyside
Lake Oswego
Oak Grove
Johnson City
Jennings Lodge
West Linn
Scappoose Bay
Scappoose Creek
North Scappoose Creek
Multnomah Channel
Columbia Slough
Willamette River
Johnson Creek
N
S
E
W
0
3
6
12
18
24
Miles
Watershed code = last two digits of sub-basin code
Note: This map is a DRAFT product for general reference only